IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Caron, et al.	Art Unit	: 1793
Serial No.	: 10/550,701	Examiner	: Stuart L. Hendrickson
Filed	: December 16, 2005	Conf. No.	: 4333
Title	: METHOD FOR TREATING TUNGSTEN CARBIDE PARTICLES		

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY TO ACTION OF NOVEMBER 10, 2010

In reply to the Office Action of November 10, 2010, Applicant submits a copy of the response as filed on September 22, 2010 including the Electronic Acknowledgement Receipt (EAR) confirming receipt of the requested reference. The dictionary reference accompanied the original response as shown by the EAR.

A prompt and favorable office action on the merits is respectfully requested.

Respectfully submitted,

Date: November 23, 2010

S. Peter Ludwig
Reg. No. 25,351

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30576862.doc

Electronic Acknowledgement Receipt

EFS ID:	8474282
Application Number:	10550701
International Application Number:	
Confirmation Number:	4333
Title of Invention:	Method for treating tungsten carbide particles
First Named Inventor/Applicant Name:	Paul Caron
Customer Number:	26211
Filer:	S. Peter Ludwig/Judi Cordo
Filer Authorized By:	S. Peter Ludwig
Attorney Docket Number:	28021-0002U51
Receipt Date:	22-SEP-2010
Filing Date:	16-DEC-2005
Time Stamp:	15:53:12
Application Type:	U.S. National Stage under 35 USC 371

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Payment Type	Deposit Account
Payment was successfully received in RAM	$1110
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Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		RESPONSE.pdf	394168 e60c04a016c798e153d66e0e1f82bf552ead97db9	yes	10

Multipart Description/PDF files in .zip description

Document Description	Start	End
Extension of Time	1	1
Amendment/Req. Reconsideration-After Non-Final Reject	2	2
Claims	3	7
Applicant Arguments/Remarks Made in an Amendment	8	10

Warnings:

Information:

2	Miscellaneous Incoming Letter	EXHIBIT.pdf	389107 a49c30288fae4f25cbd984e5280d185cfb30126f	no	4

Warnings:

Information:

3	Fee Worksheet (PTO-875)	fee-info.pdf	29937 c4a67d1401aa510cc0beda601cd990d37bc3653b	no	2

Warnings:

Information:

Total Files Size (in bytes):	813212

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP S06), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 3S U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Patent Application Fee Transmittal

Application Number:	10550701
Filing Date:	16-Dec-2005
Title of Invention:	Method for treating tungsten carbide particles
First Named Inventor/Applicant Name:	Paul Caron
Filer:	S. Peter Ludwig/Judi Cordo
Attorney Docket Number:	28021-0002US1

Filed as Large Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total In USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 3 months with $0 paid	1253	1	1110	1110

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
		Total in USD ($)		**1110**

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PETITION FOR THREE-MONTH EXTENSION OF TIME UNDER 37 C.F.R. §1.136

Please extend the period for response to the action dated March 23, 2010, for three months to and including September 23, 2010.

Please charge Deposit Account No. 06-1050 $1110, which covers the required fee. Apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: September 22, 2010

S. Peter Ludwig
Reg. No. 25,351

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AMENDMENT IN REPLY TO ACTION OF MARCH 23, 2010

This is in response to the Official Action mailed by the USPTO on March 23, 2010 and is accompanied by a petition for a three month extension of time and payment of the extension fee.

Amendments to the claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 7 of this paper.

Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently amended) A method for treating tungsten carbide particles, comprising the steps of:

a) providing a starting material containing cast eutectic tungsten carbide particles ~~of a given hardness~~ having a particle size ~~ranging from~~ between 1 μm and 5 mm and comprising WC and W2C, said tungsten carbide particles being of a W-C system whose compositions, microstructures and phase distribution are represented on an equilibrium temperature-composition binary phase diagram plotting temperature against relative concentrations of W and C, said binary phase diagram of the W-C system showing a monophasic domain of a γ solid phase corresponding to WC1-x having a face-centered cubic structure;

b) subjecting said starting material to a homogenization heat treatment in said monophasic domain, thereby obtaining WC_{1-x} monophased particles having a face-centered cubic structure;

and

c) subsequently to the homogenization treatment of step b), subjecting the tungsten carbide particles to a quenching step to freeze at ambient temperature at least a portion of the face-centered cubic structure and refine grain size of the microstructure, thereby obtaining a final product at ambient temperature containing particles with a finer miscrostructure than the starting material, a particle size about the same size as~~similar to~~ the particle size of the starting material, a composition comprising at least a portion of face-centered cubic WC_{1-x} structure, ~~and a hardness greater than said hardness of the starting material.~~

2. (Previously amended) A method according to claim 1, comprising between the homogenization heat treatment and the quenching, the step of:

-heating the WC_{1-x} monophased particles above a liquidus line of the monophasic domain to spheroidize the particles.

3. (Previously presented) A method according to claim 1 or 2, wherein said tungsten carbide particles of the starting material have an angular shape.

4. (Previously presented) A method according to claim 3, wherein said tungsten carbide particles of the starting material have an average diameter of less than 200 μm.

5.(Previously amended) A method according to claim 1, wherein said tungsten carbide particles of the starting material contains between 37% and 39% of atomic C.

6 (Canceled)

7 (Previously amended). The method according to claim 1, wherein said starting material contains at least one alloying element for enlarging said monophasic domain, thereby increasing the hardenability of the monophased particles.

8. (Previously presented) The method according to claim 7, wherein said alloying element is selected from the group consisting of Ti, V, Nb and Ta.

9. (Previously amended) The method according to claim 7, wherein said starting material further contains at least 0.1 % by weight of Nb.

10. (Previously amended) currently amended) The method according to claim 9, wherein said starting material further contains 8% by weight of Nb.

11. (Previously amended) The method according to claim 7, wherein said alloying element is cast with the tungsten carbide in said starting material.

12. (Canceled)

13. (Previously amended) The method according to claim 8, wherein said final product further contains particles of a XC_{1-x} composition, wherein X is selected from the group consisting of Ti, V, Nb and Ta.

14. (Previously presented) The method according to claim 1 , wherein the homogenization treatment of step b) comprises heating the starting material in a graphite furnace.

15. (Previously amended) The method according to claim 2, comprising the use of a graphite furnace having top and bottom chambers connected so as to allow particle circulation from the top to the bottom chamber, said homogenization treatment taking place in the top chamber, and said heating above the liquidus line taking place in the bottom chamber.

16. (Previously presented) The method according to claim 15, wherein said bottom chamber is heated by induced plasma.

17. (Previously amended) Tungsten carbide particles obtained according to the method of claim 1, said particles comprising at least a portion of face-centered cubic WC_{1-x} , a particle size ranging from 1 μm and 5 mm.

18. (Canceled)

19. (Currently amended) Tungsten carbide particles obtained according to the method of claim 8, said particles having a face-centered cubic microstructure, a first portion of said particles having

a WC_{1-x} composition, and a second portion of said particles having a XC_{1-x} composition, wherein X is selected from the group consisting of Ti, V, Nb and Ta, said particles having a particle size ~~ranging from~~ between about 1 μm and 5 mm. .

20. (Previously presented) Monophased tungsten carbide particles according to claim 19, wherein X consist of Nb and the second portion of the particles constitute more than 0.1% of said monophased tungsten carbide particles, thereby reducing the miscibility thereof at high temperature.

21. (Canceled)

22 (Previously presented) A method for treating tungsten carbide particles, comprising the steps of:

a) providing a starting material containing cast eutectic tungsten carbide particles having a particle size ranging from 1 μm and 5 mm and comprising WC and W_2C;

b) subjecting said starting material to a homogenization heat treatment at a temperature between 2535°C and 2720°C and obtaining WC1-x monophased solid particles having a face-centered cubic structure;

and

c) subsequently to the homogenization of step b), subjecting the tungsten carbide particles to a quenching treatment to freeze at ambient temperature at least a portion of the of the face-centered cubic structure and to refine the microstructure, thereby obtaining a final product at ambient temperature containing particles having a finer microstructure than the starting material, a particle size similar to the particle size of the starting material, a composition comprising at least a portion of cubic face-centered WC_{1-x}.

23. (Previously presented) A method according to claim 22, comprising between the homogenization heat treatment of step b) and the quenching treatment of step c), the step of:

-heating the particles obtained in step c) at a temperature above 2720°C to spheroidize the particles.

24. (Previously presented) Tungsten carbide particles obtained according to the method of claim 22, said particles comprising at least a portion of face-centered cubic WC_{1-x} and a particle size ranging from 1 μm and 5 mm.

25. (Previously presented) A method according to claim 22 or 23, wherein said tungsten carbide particles of the starting material have an angular shape.

26. (Previously presented) Tungsten carbide particles obtained according to the method of claim 23, said particles comprising at least a portion of face-centered cubic WC_{1-x} and a particle size ranging from 1 μm and 5 mm.

27. (Previously presented) A method according to claim 24, wherein said tungsten carbide particles of the starting material have an average diameter of less than 200 μm.

28. (Previously presented) A method according to claim 1, wherein said tungsten carbide particles of the starting material contains between 37% and 39% of atomic C.

29. (Previously presented) A method according to claim 1, wherein the hardness of the final product is at least 2900HV.

REMARKS

In this response Claims 1 and 19 have been amended .Claims 1-5, 7-11, 13-17, 19, 20 and 22-29 are pending.

Reconsideration of this application is respectfully requested.

Claim 1 has been amended to delete the term "of a given hardness" in lines 2-3. The term "ranging from" has been changed to "between " in line 3, and the term "similar' in line 20 has been amended to call for "about the same size as" These amendments are supported by the disclosure in the last sentence of paragraph 0053 of the published application. The term "and a hardness greater than said hardness of the starting material" has been deleted. No new matter is added by these claim amendments.

Rejection under 35 U.S.C.§ 112 First Paragraph

The rejection of the claims for failing to comply with the written description requirement of 35 U.S.C.§ 112 first paragraph is not believed to be well taken and is respectfully traversed.

The Examiner contends that there is no support for the initial size of the particles being between 1μ and 5mm or for the terms "similar size". It is respectfully submitted that both terms are fully supported by the specification (see for example the last two sentences of paragraph 0053 0f the published application). The clear import of these sentences is that the final particle is about the same size as the starting particle which is anywhere between 1μ and 5mm. Those skilled in the art reading this portion of the specification would clearly understand that the inventor was in possession of the starting particle size feature of the claimed invention since the size range in the claim is specifically set forth in the specification. The specification conveys with reasonable clarity to those skilled in the art that as of the filing date, the inventor was in possession of the invention now claimed. See e.g. *Vas-Cath, Inc v Mahurkar* 935 F.2nd at 1562-64 (Fed. Circ. 1991). Accordingly the rejection of the claims under 35 USC 112 first paragraph

as to the starting particle size range should be withdrawn. Since the "hardness" and "similar" limitations have been deleted from the claim, the rejection as to these features is moot.

Withdrawal of the rejection under 35 U.S.C. § 112 first paragraph is believed to be in order and such action is respectfully requested.

Rejections under 35 U.S.C. §112 Second Paragraph

The rejection of the claims for indefiniteness as to the terms "similar" is believed to be moot since this term has been eliminated from the claims.

Rejection Under 35 U.S.C. § 103

The rejection of claims 1, 3-5, 7-10,13, 17, 19, 24 and 26 as being obvious over the teachings of Kruse taken with Rudy is respectfully traversed.

The Examiner contends that Kruse teaches "...especially in ex. 1, grinding (thus homogenizing)...". This is not correct because in the field of metallurgy, grinding is not the same as homogenizing. In the metallurgical field the term "homogenize"(or "homogenization") means to "To hold metal at a high temperature long enough to eliminate by diffusion any chemical segregation of the components." (See definition of "homogenize" in McGraw-Hill Dictionary of Scientific and Technical Terms, Copyright 1974-copy attached). This is clearly not the same as grinding and is not taught or suggested in Kruse. Thus Kruse does not teach or suggest "homogenization" (as called for in the present claims, but only "grinding" which is not the same operation. For this reason the Examiners obviousness rejection is unfounded. In simple terms Kruse does not teach or suggest "homogenization" of particles as defined in the present claims .Contrary to the Examiners assertion on page 2 of the Official Action the grinding in ex. 1 of Kruse is not "homogenizing" as the term is used in the field of metallurgy and in the specification and claims of the present application.

Rudy does not teach or disclose homogenization and does not overcome the deficiencies of Kruse.

Based on the preceding comments and amendments, the rejection of claims 1,3-5, 7-20, 13, 17, 19, 24 and 26 under 35 USC § 103 for obviousness in view of Kruse and Rudy is not well taken and should be withdrawn.

In view of the comments and amendments set forth above, the present claims are believed to be in condition for allowance and such action is earnestly solicited.

Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: September 22, 2010

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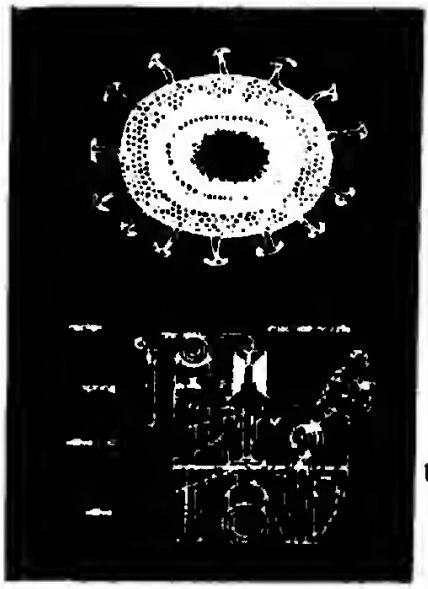

McGraw-Hill Dictionary of Scientific and Technical Terms

DANIEL N. LAPEDES Editor in Chief

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whose terms have the same total degree; equivalently it is a homogeneous function of the variables involved.

homogeneous radiation [PHYS] Radiation having an extremely narrow band of frequencies, or a beam of monoenergetic particles of a single type, so that all components of the radiation are alike.

homogeneous reactor [NUCLEO] A nuclear reactor in which fissionable material and moderator (if used) are intimately mixed to form an effectively homogeneous medium for neutrons.

homogeneous space [MATH] A topological space having a group of transformations acting upon it, that is, a transformation group, where for any two points x and y some transformation from the group will send x to y.

homogenize [MET] To hold metal at a high temperature long enough to eliminate by diffusion any chemical segregation of the components.

homogenizer [MECH ENG] A machine that blends or emulsifies a substance by forcing it through fine openings against a hard surface.

homogentisase [BIOCHEM] The enzyme that catalyzes the conversion of homogentisic acid to fumaryl acetoacetic acid.

homogentisic acid [BIOCHEM] $C_8H_8O_4$ An intermediate product in the metabolism of phenylalanine and tyrosine; found in excess in persons with phenylketonuria and alkaptonuria.

homogony [BOT] Condition of having one type of flower, with stamens and pistil of uniform length.

homograft [BIOL] Graft from a donor transplanted to a genetically dissimilar recipient of the same species.

homograft rejection [IMMUNOL] An immunologic process by which an individual destroys and casts off a tissue transplanted from a donor of the same species.

homoiochlamydeous [BOT] Having perianth leaves alike, not differentiated into sepals and petals.

homogenetic [EMBRYO] Of a determined part of an embryo, capable of inducing formation of a similar part when grafted into an undetermined field.

Homoiostela [PALEON] A class of extinct echinoderms in the subphylum Homalozoa.

homolecithal [CYTOL] Referring to eggs having small amounts of evenly distributed yolk. Also known as isolecithal.

homological algebra [MATH] The study of the structure of modules, particularly by means of exact sequences; it has application to the study of a topological space via its homology groups.

homologous [BIOL] Pertaining to a structural relation between parts of different organisms due to evolutionary development from the same or a corresponding part, such as the wing of a bird and the pectoral fin of a fish.

homologous serum jaundice [MED] A type of hepatitis caused by a filtrable virus that exists in the blood plasma and may be passed to another person through blood transfusion.

homologous stimulus [PHYSIO] A form of energy to which a specific sensory receptor is most sensitive.

homologous transformation [ASTRON] A mathematical transformation in the study of stellar models.

homologous tumor [MED] A neoplasm composed of tissue identical with those of the organ at the site of the tumor.

homology [ORG CHEM] That state, in a series of organic compounds that differ from each other by a CH_2 such as the methane series C_nH_{2n+2}, in which there is a similarity between the compounds in the series and a graded change of their properties.

homology group [MATH] Associated to a topological space X, one of a sequence of Abelian groups $H_n(X)$ that reflect how n-dimensional simplicial complexes can be used to fill up X and also help determine the presence of n-dimensional holes appearing in X. Also known as Betti group.

homology theory [MATH] Theory attempting to compare topological spaces and investigate their structures by determining the algebraic nature and interrelationships appearing in the various homology groups.

homolysis [CHEM] Symmetrical breaking of a covalent electron bond; for example, $A{:}B \rightarrow A\cdot + B\cdot$.

homometric pair [CRYSTAL] A pair of crystal structu whose x-ray diffraction patterns are identical.

homomorphism [BOT] Having perfect flowers consisting only one type. [MATH] A function between two algebr systems of the same type which preserves the algebr operations.

homomorphs [CHEM] Chemical molecules that are similar size and shape, but not necessarily having any other chan teristics in common.

Homoneura [INV ZOO] A suborder of the Lepidoptera w mandibulate mouthparts, and fore-and hindwings that s similar in shape and venation.

homonomous hemianopsia [MED] Partial blindness affecti the inner half of one field of vision or the outer half of t other; caused by optic nerve lesions posterior to the chiasm

homopause [GEOPHYS] The level of transition between t homosphere and the heterosphere; it lies about 80 to kilometers above the earth.

homopetalous [BOT] Having all petals identical.

homoplasy [BIOL] Correspondence between organs or stru tures in different organisms acquired as a result of evolutio ary convergence or of parallel evolution.

homopolar [ELEC] 1. Electrically symmetrical. 2. Havi equal distribution of charge.

homopolar bond [PHYS CHEM] A covalent bond whose tot dipole moment is zero.

homopolar generator [ELECTR] A direct-current generator which the poles presented to the armature are all of the sam polarity, so that the voltage generated in active conducto has the same polarity at all times; a pure direct current is thu produced, without commutation. Also known as acycl machine; homopolar machine; unipolar machine.

homopolar machine *See* homopolar generator.

homopolymer [ORG CHEM] A polymer formed from a singl monomer; an example is polyethylene, formed by polyme ization of ethylene.

Homoptera [INV ZOO] An order of the class Insecta includin a large number of sucking insects of diverse forms.

Homo sapiens [VERT ZOO] Modern human species; a large erect, omnivorous terrestrial biped of the primate famil Hominidae.

homoscedastic [STAT] 1. Pertaining to two or more distribu tions whose variances are equal. 2. Pertaining to a variate i a bivariate distribution whose variance is the same for al values of the other variate.

Homosclerophorida [INV ZOO] An order of primitiv sponges of the class Demospongiae with a skeleton consistin of equirayed, tetraxonid, siliceous spicules.

homoserine [BIOCHEM] $C_4H_9O_3N$ An amino acid formed as an intermediate product in animals in the metaboli breakdown of cystathionine to cysteine.

homosexual [BIOL] Of, pertaining to, or being the same sex [PSYCH] 1. Of, pertaining to, or exhibiting homosexuality. 2. One who practices homosexuality.

homosexuality [PSYCH] 1. State of being sexually attracted to members of the same sex. 2. A form of homoerotism involving sexual interest without genital expression.

homosexual panic [PSYCH] An acute syndrome that comes as a climax of prolonged tension from unconscious homosexual conflicts or sometimes bisexual tendencies.

homosphere [METEOROL] The lower portion of a two-part division of the atmosphere (the upper portion is the heterosphere) according to the general homogeneity of atmospheric composition; the region in which there is no gross change in atmospheric composition, that is, all of the atmosphere from the earth's surface to about 80–100 kilometers.

homospory [BOT] Production of only one kind of asexual spore.

homothallic [MYCOL] Having genetically compatible hyphae and therefore forming zygospores from two branches of the same mycelium.

homotopy [MATH] Between two mappings of the same topological spaces, a continuous function representing how, in a step-by-step fashion, the image of one mapping can be continuously deformed onto the image of the other.

homotopy groups [MATH] Associated to a topological space X, the groups appearing for each positive integer n, which

whose terms have the same total degree; equivalently it is a homogeneous function of the variables involved.

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homometric pair whose x-ray diff

homomorphism only one type systems of the operations.

homomorphs [c size and shape, t teristics in comr

Homoneura [IN mandibulate mc similar in shape

homonomous he the inner half o other; caused by

homopause [OS homosphere an kilometers abov

homopetalous [

homoplasy [BIO tures in differen ary convergenc

homopolar [ELE equal distributi

homopolar bond dipole moment

homopolar gene which the poles polarity, so tha has the same po produced, with machine; homo

homopolar mach

homopolymer [monomer; an e ization of ethyl

Homoptera [IN a large number

Homo sapiens erect, omnivor Hominidae.

homoscedastic tions whose var a bivariate dist values of the ot

Homosclerophc sponges of the c of equirayed, te

homoserine [a as an interme breakdown of

homosexual [a [PSYCH] 1. Of, One who pract

homosexuality members of the ing sexual inte

homosexual pa as a climax of p ual conflicts or

homosphere [division of the sphere) accordi composition; th atmospheric co the earth's surf

homospory [BO spore.

homothallic [M and therefore f same mycelium

homotopy [MA logical spaces, step-by-step fa continuously d

homotopy grou X, the groups